

**USI/CHEMPLEX/QUANTUM
CHEMICAL CO. OUTFALL STUDY, 1987**

**Rock Island Field Office
U.S. Fish & Wildlife Service
Rock Island, Illinois**

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Protection Agency dated November 2, 1989 27

SUMMARY - USI/CHEMPLEX/QUANTUM
CHEMICAL CO. OUTFALL STUDY, 1987

Sediment samples collected in 1987 from the Quantum Chemical Corporation outfall on the Upper Mississippi River detected 14 polycyclic aromatic hydrocarbons (PAH's). The highest concentration was phenanthrene at 110 ppm. Bioassays conducted on fathead minnows using sediments in the immediate vicinity of the outfall resulted in 100% mortality.

Dr. Paul Bauman concluded that the Quantum sediment PAH's were at a carcinogenic level. However, David Trauger, Director of the Patuxent Wildlife Research Center responded that the hazard potential was unknown.

Quantum estimated less than 10 cubic yards of contaminated sediment is present at the outfall. This sediment was not included in the Superfund action. However, negotiations with EPA and Quantum continue in an effort to have the contaminated sediment removed.

The NPDES permit has been tightened. Quantum Chemical is required to monitor for 63 priority pollutants associated with organic chemical manufacturing. They are also required to perform effluent toxicity testing with zero mortality permitted. Such testing to date has resulted in no mortality. Our concerns expressed to Iowa Department of Natural Resources regarding continuing potential impacts from the Quantum outfall to federally listed endangered species, Lampsilis higginsii and Haliaeetus leucocephalus, were deferred to the U.S. Environmental Protection Agency.

**Summary of bioassay and
analytical data:**

Letter to USEPA from Field Supervisor, August 4, 1987

Letter to USEPA from Field Supervisor, February 4, 1988



United States Department of the Interior

IN REPLY REFER TO: 1

FISH AND WILDLIFE SERVICE

ROCK ISLAND FIELD OFFICE (ES)

1830 Second Avenue, Second Floor

Rock Island, Illinois 61201

COM: 309-793-5800

FTS: 386-5800

August 4, 1987

Ms. Mary McGhee
U.S. Environmental Protection Agency
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. McGhee:

Attached are the results of polycyclic aromatic hydrocarbon (aromatics) analyses on sediment samples collected from the Mississippi River in the vicinity of the USI Chemical Company outfall and at other locations on the river. The highest concentrations of aromatics were detected at sites identified as USI-87-10, USI-87-11 and USI-87-8 respectively (Table 1). These samples were collected from the river opposite or just downstream from the USI outfall. The highest concentration of the 14 aromatic parameters detected for at the three upstream stations was 0.26 parts per million.

Two conclusions can be reached from these data: first, the aromatics detected below the outfall are not coming from upstream and second, relative high concentrations of aromatics are present in sediments below the sand layer in the river opposite the outfall and in surface sediments just downstream from the outfall.

The elevated concentrations of aromatics detected below the outfall in this study are similar to concentrations in sediments at the other locations that cause cancer in fish according to a Fish and Wildlife Service tumor expert. Fish congregate in the discharge area especially during the fall and winter. Bald eagles, that feed primarily on fish, frequent the discharge area in the winter.

The Mississippi River in the vicinity of the outfall is classified as Class A and B water according to the Iowa State Water Quality Standards. Class A and B waters are to be protected for wildlife, fish, aquatic and semi-aquatic life and primary human contact uses.

The Fish and Wildlife Service has received a copy of Draft Public Notice Number 86-418 issued by the Iowa Department of Natural Resources. The Service recommends that the following modifications be made in the permit:

1. The contaminated river sediments opposite and downstream from the discharge outfall should be cleaned up before the permit is issued.
2. Effluent discharged into the river should be free of polycyclic aromatic hydrocarbons.

3. The monitoring of river sediments opposite and downstream from the discharge outfall for polycyclic aromatic hydrocarbons should be required as part of the permit.
4. The draft permit requires that only two aromatics (fluorene and phenanthrene) be monitored in water. Aromatics are not highly soluble in water and they do not bioaccumulate in fish. Although they are metabolized by and are harmful to fish. It is recommended that naphthalene, anthracene, fluoroanthrene, pyrene, 1,2-benzanthracene, chrysene, benzo(b)fluoranthrene, benzo(k)fluoranthrene, benzo(e)pyrene, benzo(a)pyrene, 1,2,5,6-dibenzanthracene, and benzo(g,h,i)perylene also be monitored for in water and sediments.

The Service recommends that a meeting be held to discuss the above recommendations before the permit is issued. A list of agency representatives that should be invited to this meeting should include:

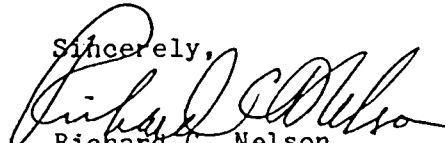
USI Chemical Company
Wastewater Permits Section, Environmental Protection Division, Iowa
Department of Natural Resources
Fish and Wildlife Division, Iowa Department of Natural Resources
Superfund Section, U.S. Environmental Protection Agency
Permits Section, U.S. Environmental Protection Agency
Refuge Division, U.S. Fish and Wildlife Service
Research Division, U.S. Fish and Wildlife Service
Contaminants Division, U.S. Fish and Wildlife Service

The Fish and Wildlife Service representative from the Division of Research will not be available to attend the meeting until after August 17th. Therefore, it is recommended that the meeting be held in late August.

The USI Chemical Company recently announced that the Comanche, Iowa plant is being considered for expansion. This expansion could double or triple the plants production capacity. The potential exists for increased effluent discharge to the river if the plant is expanded. Therefore, it is important that this permit include adequate environmental protection criteria because if the plant does expand, this permit will set a precedent for additional or revised permits that may be required.

We would appreciate your comments on the concentrations of aromatics present in the River below the USI outfall, the recommendations made in this letter and a mutually accepted meeting date. Contact Dick Ruelle or me.

Sincerely,



Richard C. Nelson
Field Supervisor

Attachment
Table 1.

Table 1. Results of polycyclic aromatic hydrocarbon analyses (ppm) on sediments collected from in the vicinity of the USI Chemical Company outfall and at other locations on the Mississippi River, June 1987.

Location	I.D. Number	Aromatic/Concentration														
		Naphthalene	Fluorene	Phenanthrene	Anthracene	Fluoranthrene	Pyrene	1,2-Benz-anthracene	Chrysene	Benzo(b)fluoranthrene	Benzo(k)fluoranthrene	Benzo(e)pyrene	Benzo(a)pyrene	1,2,5,6-Dibenz-anthracene	Benzo(g,h,i)-Perylene	
Length of Determann's Harbor (above mouth to upper end)	USI-87-1	0.06	0.04	0.12	0.03	0.12	0.07	0.07	0.07	0.04	0.01	0.06	0.03	0.04	0.10	
Across from and 150 feet downstream from Comanche boat ramp	USI-87-2	0.04	0.04	0.21	0.05	0.26	0.20	0.16	0.15	0.13	0.02	0.12	0.18	0.04	0.08	
Just downstream from Comanche Sewage Treatment Plant	USI-87-3	0.01	0.01	0.02	0.01	0.03	0.04	0.02	0.02	0.01	0.01	0.04	0.02	0.04	0.02	
Opposite upstream part of USI outfall area	USI-87-4	0.01	0.01	0.02	0.01	0.05	0.03	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.02	
Opposite middle part of USI outfall area	USI-87-5	0.01	0.01	0.02	0.01	0.05	0.06	0.04	0.06	0.03	0.01	0.06	0.04	0.03	0.05	
Opposite downstream part of USI outfall area	USI-87-6	0.34	0.95	1.8	0.35	0.36	0.61	0.25	0.19	0.04	0.02	0.09	0.07	0.02	0.04	
Rock Creek just upstream from its confluence with the unnamed tributary that flows thru the Hawkeye Chemical Plant	USI-87-7	0.01	0.01	0.02	0.01	0.04	0.02	0.02	ND	0.01	ND	ND	ND	ND	ND	
Below sand layer, within 4 feet of shore just opposite USI outfall area	USI-87-8	6.2	18.0	31.0	5.2	5.3	9.3	3.7	2.8	1.1	0.16	1.0	1.6	0.34	0.59	

Table 1 Continued.

Location	I.D. Number	Aromatic/Concentration													
		Naphthalene	Fluorene	Phenanthrene	Anthracene	Fluoranthrene	Pyrene	1,2-Benz-anthracene	Chrysene	Benzo(b)fluoranthrene	Benzo(k)fluoranthrene	Benzo(e)pyrene	Benzo(a)pyrene	1,2,5,6-Dibenz-anthracene	Benzo(g,h,i)-perylene
Ponded area 3 feet west of outfall on land	USI-87-9	0.16	0.19	0.37	0.24	0.34	0.89	0.81	2.1	0.29	0.05	0.16	0.63	0.08	0.48
In river opposite outfall in 3 feet of water and 6 inches below sand layer	USI-87-10	41.0	91.0	110.0	31.0	16.0	30.0	7.0	2.1	1.2	0.12	1.8	1.6	0.69	1.4
In river 30 feet downstream from outfall 10 feet from shore, surface of bottom	USI-87-11	16.0	36.0	50.0	9.0	6.6	12.0	3.5	3.9	0.85	0.35	1.3	1.9	0.32	0.66
In Rock Creek 200 feet upstream from its confluence with unnamed tributary that joins Rock Creek just west of USI plant	USI-87-12	ND	0.01	0.03	0.01	0.03	0.02	0.01	ND	ND	ND	0.01	ND	ND	0.01

ND = Not Detected

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Kansas City, Kansas 66101

Ms Mary McGhee
U.S. Environmental Protection Agency
726 Minnesota Ave.
Kansas City, Kansas 66101



United States Department of the Interior

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FISH AND WILDLIFE SERVICE

IN REPLY REFER TO:

ROCK ISLAND FIELD OFFICE (ES)

COM: 309/793-5800

1830 Second Avenue, Second Floor

FTS: 386-5800

Rock Island, Illinois 61201

February 4, 1988

Nancy Johnson
U.S. Environmental Protection Agency
726 Minnesota Avenue
Kansas City, Kansas 66111

Dear Ms. Johnson:

Enclosed are the summarized results of bioassays and chemical analyses conducted on effluents from within the USI Chemical Company plant and on sediments collected from the Mississippi River in the vicinity of the plant's outfall. For the bioassays, one part sediment was mixed with three parts water and allowed to stand overnight or longer before the larval fathead minnows were introduced. A water sample was removed from the bioassay vessels just before the organisms were added. Test duration was until all organisms died or 96-hours, whichever came first.

All fathead minnows died in the bioassays conducted with sediments collected from within the immediate vicinity of the USI discharge. See the attached data sheets for a summary of the fish bioassay results.

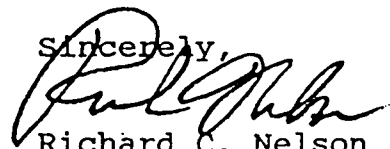
Sediments collected for these bioassays were, based on appearance, the most contaminated that could be found in the area. These sediments were highly toxic to the test species; however, they may not be representative of all sediments in the vicinity of the discharge.

The samples that caused the greatest mortality in fish during the bioassays also had the greatest variety of organic, especially volatile organic, contaminants. Only contaminants that were detected during analyses have been reported on the attached sheets.

In the bioassays conducted with the effluent collected from inside the plant, 25 percent of the fish died within 96 hours.

Please contact me or Dick Ruelle (309/793-5800) if you have any questions concerning the data.

Sincerely,


Richard C. Nelson
Field Supervisor

Paul Bauman
USI Chemical Co.
Tom Boland
RF2, Region 3
Jim Lennartson
State Permits Section
State Water Quality

Results--USI Chemical Company (Summary) BIOASSAY

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<u>Location</u>	<u>Result</u>
Sediment sample from Swan Slough directly across from Comanche Sewage Treatment Plant	4 of 20 (20%) of fathead minnows died in 96-hours 0 of 20 fish died in the control sample
Same as above	1 of 20 (5%) of fathead minnows died in 96-hours 0 of 20 fish died in the control sample
Sediment sample along rip-rap opposite and slightly downstream from USI outfall	21 of 21 (100%) of fathead minnows died in 24-hours 1 of 20 fish died in the control sample
Same as above	19 of 19 (100%) of fathead minnows died in 24-hours 1 of 20 (5%) of fish died in the control sample
Sediment sample just downstream from USI outfall	20 of 20 (100%) of fathead minnows died in 24-hours 1 of 20 (5%) of fish died in the control sample
Same as above	20 of 20 (100%) of fathead minnows died in 24-hours 1 of 20 (5%) of fish died in the control sample
Sediment sample collected 30-feet downstream from USI Chemical Co. outfall	21 of 21 (100%) of fathead minnows died in 24-hours 1 of 20 (5%) of fish died in the control sample
Same as above	20 of 20 (100%) of fathead minnows died in 24-hours 1 of 20 (5%) of fish died in the control sample
Effluent from within the plant.	5 of 20 (25%) of fathead minnows died in 96-hours 1 of 21 (4.8%) of fish died in control sample

Results--USI Chemical Company (Summary) CHEMICAL ANALYSES

<u>Location</u>	<u>Compound</u>	<u>Concentration ⁹ ug/kg</u>
Final effluent	Phenanthrene	2.9
Final effluent	Benzo(a)pyrene	0.035
24-hour composite of final effluent	Phenanthrene	3.3
	Fluoranthene	0.019
	Pyrene	0.50
Sediment from Swan Slough across from Comanche Sewage Treatment Plant	35 compounds analyzed for (organics)	None detected
Same as above	16 aromatics analyzed for:	
	Phenanthrene	67
	Benzo(a)anthracene	63
	Chrysene	66
	Benzo(a)pyrene	75
Sediment sample along rip-rap opposite and slightly downstream from USI outfall	35 compounds analyzed for (organics):	
	Acetone	435
	Toluene	9
	Ethylbenzene	286
	Total xylenes	55
Same as above	16 aromatics analyzed for:	
	Naphthalene	4700
	Acenaphthylene	18000
	Acenaphthene	29000
	Fluorene	33000
	Phenanthrene	53000
	Anthracene	12000
	Fluoranthrene	11000
	Pyrene	18000
	Benzo(a)anthracene	3700
	Chrysene	2500
	Benzo(b)fluoranthrene	1400
	Benzo(a)pyrene	1800
Sediment sample just downstream from USI outfall	35 compounds analyzed for (organics):	
	Acetone	520
	Benzene	35
	Toluene	46
	Chlorobenzene	53
	Ethylbenzene	1990
	Styrene	50
	Total xylenes	810

Results--USI Chemical Company (Summary) Continued

<u>Location</u>	<u>Compound</u>	<u>Concentration ug/kg</u> 10
Sediment sample just downstream from USI outfall	16 aromatics analyzed for:	
	Naphthalene	23000
	Acenaphthylene	6800
	Acenaphthene	28000
	Fluorene	33000
	Phenanthrene	79000
	Anthracene	14000
	Fluoranthene	11000
	Pyrene	16000
	Benzo(a)anthracene	4600
	Chrysene	4700
	Benzo(a)pyrene	1800
Sediment sample collected 30-feet downstream from USI Chemical Co. outfall	35 compounds analyzed for (organics):	
	Acetone	120
	Toluene	73
	Ethylbenzene	809
	Total xylenes	420
Same as above	16 aromatics analyzed for:	
	Naphthalene	10000
	Acenaphthylene	3000
	Acenaphthene	14000
	Fluorene	18000
	Phenanthrene	48000
	Anthracene	8100
	Fluoranthene	6000
	Pyrene	8200
	Benzo(a)anthracene	2500
	Chrysene	2600
	Benzo(a)pyrene	1100

Sediment samples collected from USI Chemical Company outfall area on Sept. 22, 1987. Samples consist of three septum vials and two liter jars of sediment per site.

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Sample No. 1. From Swan Slough directly across from the Comanche, Iowa Sewage treatment plant outfall.

Sample No. 2. From along rip-rap just opposite and slightly downstream from the USI Chemical Company outfall.

Sample No. 3. From three feet deep--just downstream from the USI Chemical Co. outfall. Sample was taken almost opposite the outfall but slightly downstream.

Sample No. 4. From about ⁴⁰~~30~~ feet downstream from the USI Chemical Co. outfall and in about 3 feet of water. Sample was collected just upstream from culvert that sticks out of the water during low water.

Expert review of
analytical data:

Letter to RCA Specialist from Dr. Paul Bauman,
National Fisheries Contaminant Research Center,
January 27, 1987

Letter to Contaminant Biologist from Director,
Patuxent Wildlife Research Center,
February 11, 1987



United States Department of the Interior
FISH AND WILDLIFE SERVICE
NATIONAL FISHERIES CONTAMINANT RESEARCH CENTER
ROUTE 1
COLUMBIA, MISSOURI 65201

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IN REPLY REFER TO:

January 27, 1987

Dick Ruelle
U.S. Fish and Wildlife Service
RCA Specialist
Rock Island Field Office (ES)
1830 Second Avenue, Second Floor
Rock Island, Illinois 61201

Dear Dick:

I have reviewed the data you sent me on contaminants in the vicinity of the Chemplex or Norchem site. The sediment analysis performed by the Mississippi State Chemical Laboratory on sample #138 from that location reveals a very high concentration of polynuclear aromatic hydrocarbons (PAHs). I have enclosed a table of PAH concentrations determined from a variety of marine and freshwater sediments, both contaminated and reference locations; values are in ppm. Sample #138 contains phenanthrene in hundreds of ppm. Only the Black River, Ohio has a higher concentration. Benzo(a)pyrene (BaP) in sample #138 was over a part-per-million; this is within the range of BaP values for locations having epizootics of cancer in fish. Values for BaP from the four reference locations where BaP was analyzed as a separate compound range only as high as four hundredths of a part-per-million. In my opinion the PAH concentrations from this sediment indicate a location with the potential to cause cancer in benthic feeding fish species.

The lack of PAHs in your water sample is expected. All PAHs, particularly the longer chain compounds are not very water soluble.

Your fish data is interesting in that phenanthrene was documented in both shad and white bass. Since fish are capable of rapidly metabolizing parent PAH compounds, PAHs are not often detected in fish tissue. Bullhead from the Black River, Ohio, one of the most contaminated locations known, have phenanthrene at ppm levels. Your shad contain 300 ppb and, as you pointed out in your cover letter, they are plankton feeders, and as such would not be exposed as greatly as would benthic feeders. Furthermore due to rapid metabolism of long chain PAHs, even Black River bullhead have BaP concentrations under 10 ppb, which is below the detection limits of your laboratory.



United States Department of the Interior
FISH AND WILDLIFE SERVICE
NATIONAL FISHERIES CONTAMINANT RESEARCH CENTER
ROUTE 1
COLUMBIA, MISSOURI 65201

IN REPLY REFER TO:

Finally your downstream sediment samples show reduced PAH loadings, again as expected. PAHs, as mentioned before, are not very water soluble. Dr. Jack Black in a study done in Michigan found PAH concentrations declined rapidly (a double exponential curve) downstream from a point source, then plateaued. However it is important to note that your Chem 9S sample still has BaP levels an order of magnitude greater than the reference locations listed on my table.

There may well also be non-carcinogenic effects of the PAHs. Some recent research has linked high contaminant levels with increases of fungal and bacterial lesions. These may be the cause of the hemorrhaging you have noted. Such effects may be due to immune system suppression. More work needs to be done in this area.

In summary, you have a sediment that is very highly contaminated with PAHs near the Chemplex discharge. Sediments from a variety of areas having PAHs in this range have been associated with epizootics of tumors in benthic feeding fish. Since fish move about, the highly contaminated sediment, even if small in area, may affect large numbers of certain species, and may affect population health over a broad area.

Sincerely,

Paul C. Baumann, Ph.D.
Leader, Field Research Station
Adjunct Assistant Professor
O.S.U. - Dept. of Zoology

enc.

Concentrations of selected PAHs in sediment (ug/g dry weight) from areas with epizootics of neoplasia in fish (E) and reference locations (R). If multiple samples were taken, the concentration represents the arithmetic mean. NA means data not available. ND means compound not detected.

Sites	phenanthrene	fluoranthene	pyrene	chrysene	B(a)A ^d	B(b)F ^b	B(k)F ^c	benzo(a)pyrene
<u>Puget Sound</u>								
Duwamish Waterway (E) ^{67,68} (n=5)	1.2	1.8	1.7	NA	1.3	NA	NA	0.66
Hylebos Waterway (E) ^{67,68} (n=4)	2.0	2.0	2.2	2.0	1.2	-----3.0 ^g -----		0.57
Mukilteo Waterway (E) ^{32,67} (n=2)	2.4	3.35	2.8	1.4	0.83	-----1.3 ^g -----		0.36
Eagle Harbor (E) ⁶⁷ (n=3)	13	NA	27	NA	8.0	NA	NA	3.1
Port Madison (R) ⁶⁷	0.04	NA	0.07	NA	0.05	NA	NA	0.02
President Point (R) ^{32,67}	0.15	0.22	0.09	0.14	0.07	-----0.1 ^g -----		0.04
<u>Great Lakes/Freshwater</u>								
Smokes Creek (E) ^{46,d}	0.93	7.6	2.0	18	1.5	1.9	0.73	1.6
Union Ship Canal (E) ^{46,d}	7.5	33	24	14	7.1	11	3.4	6.4
Buffalo River (E) ^{46,d}	23	28	38	9.5	7.5	6.5	3.4	6.8
Black Rock Canal (E) ^{46,d}	3.4	9.9	11	2.7	3.2	3.8	2.4	3.4
Cuyahoga River (E) ⁵⁸	4.7	7.2	5.6	3.1	2.2	2.6	2.0	2.6
Black River (E) ^{58,e}	52	33	24	10	11	12	12	8.8
Black River (E) ^{14,f}	390	220	140	51	51	-----75 ^g -----		43
Lake Ontario (R) ⁶⁹ 0-05 cm	NA	0.28	0.056	0.22	NA	NA	NA	0.337 ^h
Lake Ontario (R) ⁶⁹ 10-15 cm	NA	0.058	0.029	0.088	NA	NA	NA	ND
Munuscong Lake (R) ⁵⁸ (St. Marys River)	0.077	0.10	0.11	0.069	0.046	-----0.091 ⁱ -----		0.044
Buckeye Lake (R) ⁵⁸	0.04	0.11	0.072	0.028	0.021	-----0.36 ^g -----		0.014

a B(a)A represents benz(a)anthracene

b B(b)F represents benzo(b)fluoranthene

c B(k)F represents benzo(k)fluoranthene

d converted from ng/gm wet weight assuming 55% moisture content of sediment

e composite of 10 samples from point source to 1/2 km downstream

f point source

g combined concentrations of all benzo(b)fluoranthene

h combined concentrations of all benzo(k)fluoranthene

i combined concentrations of benzo(b)fluoranthene and benzo(k)fluoranthene



United States Department of the Interior

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FISH AND WILDLIFE SERVICE
PATUXENT WILDLIFE RESEARCH CENTER
LAUREL, MARYLAND 20708

February 11, 1987

Memorandum

To: Richard Ruelle, Contaminant Biologist
Rock Island Field Office (ES)

From: Director, Patuxent Wildlife Research Center (PWRC)

Subject: Interpretation of Analytical Report

We are able to provide only very limited interpretation of the analytical report (Lot 5198) on aliphatic and aromatic hydrocarbons in fish near a permitted discharge on the Mississippi River and the possible impact on bald eagles. First, the hydrocarbons that were analyzed are only a subset of the total hydrocarbons that may have been present. For comparative purposes, it would have been helpful to have known the total quantity of hydrocarbons present in the samples without a breakdown of the fractions.

The hazard potential is unknown. All we can tell is if the samples tend to be contaminated when compared to other data sets. A copy of a reprint containing one such data set is enclosed for your information. The list of aliphatic hydrocarbons that your samples were analyzed for and those in the Pennsylvania study were similar. The fish in the Pennsylvania study, where no oil development was present, cannot be considered as being from a truly "control" site. However, the total concentration of selected aliphatics in your white bass sample (5.88 ppm) was about one-half that in fish from areas of no oil development (about 10 ppm) in the Pennsylvania study. The gizzard shad in your study contained essentially no aliphatics.

Few aromatics were found in the fish from your study; however, one does not generally expect to find them in animal tissue. They tend to occur in the environment in smaller concentrations than aliphatics. Heavier aromatics tend to be more persistent, but your scan does not appear to include heavy aromatics. The heavy aromatics also tend to be more toxic to birds than light aromatics.

Some types of petroleum compounds come from natural biological sources. Those that are present in these fish appear to originate from petroleum sources. A large array of aliphatics, such as was found in the white bass, with no dominance of one or two compounds, indicates a petroleum source. However, the quantities that are present appear to be low. The low concentrations of the few aromatics that were detected should not be cause for concern.

We are unable to interpret the list of unknown components. Some may not even be petroleum hydrocarbons.

We hope that these comments and the publication will be helpful in evaluating the permit renewal. If we can be of further assistance, please let us know.

David L. Trauger

David L. Trauger

Attachment

NPDES permit recommendations:

Letter to IDNR Wastewater Permit Section Supervisor
from Field Supervisor, October 7, 1987

Draft Fish and Wildlife Service Recommendations

COM: 309/793-5800
FTS: 386-5800

October 7, 1987

Mr. Lavoy Haage
Iowa Department of Natural Resources
Waste Water Permit Section
Henry A. Wallace Building
Des Moines, Iowa 50319

Dear Mr. Haage:

This letter is a follow-up of discussions that were held at your office on September 21, 1987 among representatives from the Iowa Department of Natural Resources, the U.S. Environmental Protection Agency, USI Chemical Company and Dick Ruelle of the U.S. Fish and Wildlife Service concerning the National Pollution Discharge Elimination System permit requested by the chemical company. We have two separate but related concerns regarding the aquatic environment in this area. The first concern is that polynuclear aromatic hydrocarbons (aromatics) could become elevated in Rock Creek or in the Mississippi River sediments. The second is to insure that the permit is structured so that it includes environmental safeguards. Service comments and concerns for the protection of the environment, which we agreed to provide to you at this meeting are listed below.

To prevent the discharge of aromatics into waterways in the vicinity of the plant and to detect their presence should they enter a waterway we make the following recommendations.

1. Effluent discharged into the river should be free of aromatics.
2. The draft permit requires that only two aromatics (fluorene and phenanthrene) be monitored in water. Aromatics are not highly soluble in water and they do not bioaccumulate in fish, although they are metabolized by and are harmful to fish. It is recommended that analyses for naphthalene, anthracene, fluoranthrene, pyrene, 1,2-benzanthracene, chrysene, benzo(b)fluoranthrene, benzo(k)fluoranthrene, benzo(e)pyrene, benzo(a)pyrene, 1,2,5,6-dibenzanthracene, and benzo(g,h,i)perylene be monitored periodically in the effluent.
3. Sediments in the detention pond should be collected at least once a year and analyzed for aromatics. If possible, these samples should be split between the State and the company. These should be composite samples one of which should be collected from the immediate vicinity of the pond inflow and one from the center of the pond.

It is possible that the effluent discharged into the river could be aromatic free most of the time and still an infrequent waste slug discharge could

introduce high concentrations of aromatics into the river. Therefore, the following recommendations are made to protect drainages in the vicinity of the site.

1. River sediments opposite and downstream from the outfall should be collected semi-annually by a State or Federal agency and analyzed for a full compliment of aromatics. It is recommended that sediment monitoring be initiated after remedial action, if any is needed, has been completed.
2. Sediments from several locations in Rock Creek downstream from the plant should be collected semi-annually and analyzed for a full compliment of aromatics.

We appreciate the opportunity to comment on this permit. If you have any questions, please contact Dick Ruelle or me at (309) 793-5800

Sincerely,



Richard C. Nelson
Field Supervisor

DRAFT

Fish & Wildlife Service
Recommendations

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1. Sediments in the area downstream from the point where the effluent enters the Mississippi River should be cleaned up if it is determined that they constitute a hazardous waste site.
2. The company should not be permitted to discharge effluent containing aliphatic or aromatic PAHs into the river. The discharge of effluent that would cause PAH buildup in the sediments is entirely unsatisfactory.
3. Presently the company is only required to monitor on its property. They also should monitor sediments in the river (and possibly Rock Creek) and freshwater mussels from the river.
4. The company is only required to monitor for fluorene and phenanthrene in the draft permit. Service studies revealed that naphthalene, anthracene, fluoranthrene, pyrene, 1,2-benzanthracene, benzo(e)pyrene and benzo(a)pyrene are also present in the sediments just below the effluent at concentrations above 1 ppm. The applicant should be required to monitor at least quarterly, the sediments below the discharge and in Rock Creek for these compounds. These are Class A and B waters according to State Water Quality Standards and should be safe for fish, wildlife and human contact.
5. The monitoring of effluent for PAHs is not scientifically sound. PAHs are not highly soluble in water; therefore, the analyses of effluent for these compounds is of little value. PAHs should be captured at the plant and disposed of according to EPA approved procedures.
6. The use of detention basins on the applicant's property is the least desirable holding method for effluents containing PAHs. Detention basins are too susceptible to leaks.
7. PAHs are metabolized so rapidly in fish that they do not bioconcentrate. Thus, it would not be worth the time or effort to collect fish from the river for analyses. Some compounds that are rapidly metabolized are also highly carcinogenic. This includes the PAHs. There are many freshwater mussels in the river and mussels do bioconcentrate PAHs.
8. Rock Creek, which enters the river downstream from the effluent and receives runoff drainage from the site is included in this permit. There have been several chemical occurrences on the site that could contribute contaminants to the creek. The Service has not had an opportunity to evaluate the PAH concentrations in Rock Creek sediments. There have been reports that fish in the creek are thin and unhealthy. Fish should be collected from the creek and analyzed for tumors or cell aberrations by a histopathologist.
9. Chemical analyses the company is required to perform as a stipulation of this permit should be done at an EPA contract laboratory using EPA approved procedures.

Iowa Department of Natural Resources
response to our October 7, 1987
recommendations:

Letter to Field Supervisor from Wastewater Permits
Section Supervisor, IDNR, October 20, 1987



TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

October 20, 1987

Mr. Richard C. Nelson
Field Supervisor
United States Department of Interior
Fish and Wildlife Service
Rock Island Field Office
1830 Second Avenue, Second Floor
Rock Island, IL 61201

RE: NPDES Permit No. 23-26-1-12
USI Chemicals Company, Clinton, Iowa

Dear Mr. Nelson:

We appreciate your interest in protecting the waters of the State and particularly that of the aquatic environment. Thus, in response to your October 7, 1987 letter and our last meeting on September 21, 1987, regarding effluent from USI Chemicals Company, we offer the following:

Effluent limitations of aromatics are limited only to fluorene and phenanthrene, since we did not agree to add more parameters during our last discussion. However, it was stated in the effluent limitations requirements that effluent limitations are subject to be amended if future studies require adding additional parameters. We are willing to amend the NPDES permit in the future if future data shows significant adverse conditions on water quality standards.

Beside the regular monitoring requirements for fluorene and phenanthrene, we also required USI Chemicals Company to report a composite of aliquots from four (4) other 24-hour Composite samples on the same sampling frequency on a weekly basis. This extra addition of monitoring requirements has been discussed and agreed during our last meeting with all interested parties.

The final NPDES effluent limitations were developed assuming that all waste contributed from USI Chemicals Company are limited only to discharge from a final polishing pond which receives wastewater from process wastewater, treated sanitary water, cooling water, and treated storm water.

I believe that river sediments should be handled through EPA superfund as we discussed in our meeting.

OCT 22 1987

Mr. Richard C. Nelson
Rock Island, IL
October 20, 1987
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If you have any further questions on the Department's position regarding this NPDES permit, please feel free to contact me at 515/281-8885 or Mohammed Shams at 515/281-4216.

Sincerely,



LAVOY HAAGE
SUPERVISOR
WASTEWATER PERMITS SECTION

LH:MS:pla/ROCK

cc: EPA, Mary McGhee, Kansas City, KS
Bob Schuler, USI Chemicals Co.
Field Office 6
Wastewater Permit Section

**Fish and Wildlife Service
response to "Sediment Study, Mississippi
River, area around the USI outfall"
prepared by Quantum
Chemical Corporation:**

Letter to USEPA from Field Supervisor, January 20, 1989



United States Department of the Interior

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FISH AND WILDLIFE SERVICE COM: 309/793-5800
ROCK ISLAND FIELD OFFICE (ES) FTS: 386-5800
1830 Second Avenue, Second Floor
Rock Island, Illinois 61201

IN REPLY REFER TO:

January 20, 1989

Mr. Craig Smith
U.S. Environmental Protection Agency
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Mr. Smith:

We have reviewed the report: "Sediment Study; Mississippi River; Area around the USI outfall" prepared by the Quantum Chemical Corporation. The major findings that can be reached from this and other studies that have been conducted on the area are summarized as follows:

1. There are relatively high concentrations of polycyclic aromatic hydrocarbons (PAHs) in the river sediments opposite from and downstream from the USI outfall.
2. There is no consistent pattern to the lateral and vertical PAH distribution. Sediments containing relatively low PAH concentrations are located within feet of areas containing elevated PAH concentrations.
3. PAH concentrations in some sediments in the immediate vicinity of the outfall are much higher than PAH concentrations detected at upstream and downstream control sites. PAHs drop out of the water column rapidly; therefore, the possibility of contaminants extending to sediments a half-mile or more downstream is remote.
4. The Service method of removing sediment samples with a shovel and preliminarily classifying contaminants present in them by sight and smell is an effective method of selecting highly contaminated sediments for analyses. In this instance, the procedure was effective for identifying contaminant hot spots. The PAH concentrations in these sediments were then confirmed through analyses. Each Service sample collection site was located in relation to surveyed-in posts by measuring with a steel tape and individually identifying each location on a map.

The Service elected to not split samples for analyses because the University of Iowa Hygienic Laboratory is certified by U.S. EPA as a Contract Laboratory Procedure laboratory. We have a high regard

for the quality control procedures that a laboratory must follow to become certified by EPA. Therefore, it was not believed to be necessary to conduct cross-check analyses on a laboratory of this caliber.

EPA and the associated state health agency have jurisdiction over human health. They are qualified to determine if sediments in the vicinity of the USI outfall are a threat to humans health. The State wildlife and fish officials and the Service have jurisdiction for determining contaminant impacts to their respective fish and wildlife resources. Therefore, our comments only address contaminant impacts to our trustee resources.

The outfall flows continually. Consequently the moving water makes this reach of the river one of the last places to freeze over in the winter. The open and flowing water attracts waterfowl and other wildlife. In addition, fish congregate below the discharge. These fish are preyed upon by other fish and predators such as the bald eagle, a Federally endangered species.

Conclusions:

PAHs are powerful carcinogens and even low concentrations present a health threat to humans, fish and wildlife. The report estimates that less than 10 cubic yards of contaminated sediment are present in the river in the vicinity of the outfall. Cost to cleanup this small amount of contaminated sediment should be minimal and easily justifiable.

The Service is highly concerned about cumulative impacts that could occur to the environment from a multitude of sites similar to the USI Chemical Company site. The environmental injury caused by one site may be small and localized; however, if the river is lined with many such sites, the cumulative downstream impacts of contaminants from all sites can be extensive.

The waters in this reach of the river are categorized as Class A and B according to State Water Quality Standards. These classifications mean that they are safe for human contact fish and wildlife. Presently, the river in the vicinity of the outfall does not meet State Water Quality Standards because of the high concentration of PAHs present in the sediments.

Recommendations:

Sediments below outfalls are not required to be collected and analyzed as part of the National Pollution Discharge Elimination System permit process. It is recommended that sediments be included as part of the standard permit monitoring process when there is reason to believe that toxic compounds are accumulating in the sediments.

Sediments below the outfall should be collected and analyzed for PAHs periodically in the future. It will not be possible to distinguish between existing and new PAH contaminants in these

sediments (if any are detected) unless the present contaminated sediments are removed and the area is determined to be contaminant free.

We thank you for the opportunity to comment on this report. If you have any questions, please contact Dick Ruelle of my staff.

Sincerely,

A handwritten signature in cursive script, appearing to read "Richard C. Nelson".

Richard C. Nelson
Field Supervisor

**Fish and Wildlife Service
response to Quantum Chemical Corporation
NPDES permit dated February 17, 1992:**

**Letter to Iowa Department of Natural Resources
from Field Supervisor dated March 30, 1992**

**Response from Iowa Department of Natural Resources
dated April 9, 1992, with attachment from
U.S. Environmental Protection Agency
dated November 2, 1989**



IN REPLY REFER TO:

United States Department of the Interior

TAKE
PRIDE IN
AMERICA

FISH AND WILDLIFE SERVICE
Rock Island Field Office (ES)
4469 - 48th Avenue Court
Rock Island, Illinois 61201

COM: 309/793-5800
FTS: 782-5800

March 30, 1992

Mr. Wayne Farrand, Supervisor
Wastewater Permits Section
Environmental Protection Division
Iowa Department of Natural Resources
900 East Grand Avenue
Des Moines, IA 50319

Dear Mr. Farrand:

This letter provides our comments on the NPDES Permit dated February 17, 1992, for Quantum Chemical Corporation to discharge into the Mississippi River near Camanche, Iowa. The outfall is across from lands managed as The Upper Mississippi National Wildlife and Fish Refuge and is in the vicinity of federally-listed endangered species. In general, we remain concerned that chemicals discharged from the Quantum plant will adhere to sediments in the vicinity of the discharge and become bioavailable.

Sampling and analysis we performed in 1987 indicated that sediments near the discharge area had elevated concentrations of polycyclic aromatic hydrocarbons (PAH's). Even if discharge levels are reduced from previous years, we remain concerned that PAH's will continue to contaminate nearby sediments.

In 1991, the federally-listed endangered Higgin's Eye Pearly Mussel (Lampsilis higginsii) was found about five hundred feet downstream of the outfall. The federally-listed endangered Bald Eagle (Haliaeetus leucocephalus) is present in good numbers during the winter and feeds in the open waters of Pool 14. Due to the use of the habitat near the outfall by federally-listed endangered species, we recommend a biological assessment be prepared to determine if the discharge will impact endangered species.

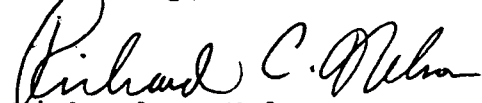
We also recommend that the sediments within five hundred feet of the outfall be monitored on a yearly basis. We understand that the discharges are now occurring. However, bioaccumulation over

time may affect the endangered species and other important fish and wildlife resources.

We do not object to issuance of the permit provided sediments are monitored for contaminants on a yearly basis. However, we recommend a reopener clause be allowed pending the determination of the biological assessment. Should impacts to the endangered species be identified, alterations may need to be made to the permit to protect the endangered species. By copy of this letter, we are informing the U.S. Environmental Protection Agency of our request for endangered species consultation.

We would be pleased to work with you on development of the biological assessment. If there are any questions, please contact Jody Millar of this office.

Sincerely,



Richard C. Nelson
Field Supervisor

cc: USEPA (Summers)
IADNR (Boland)

JM:hw



TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

April 9, 1992

Mr. Richard C. Nelson
Field Supervisor
U.S. Fish and Wildlife Service
Rock Island Field Office
4469 49th Avenue Court
Rock Island, Illinois 61201

Subject: Quantum Chemical Corporation
Proposed NPDES Permit #23-26-1-12

Dear Mr. Nelson:

Your March 30, 1992 letter provided comments on the February 17, 1992 draft NPDES permit for the Quantum Chemical Corporation in Camanche, Iowa. In particular, your letter raises your concerns that polycyclic aromatic hydrocarbons (PAH's) in the discharge will adhere to sediments in the river and have an impact on endangered species, especially the Higgin's Eye Pearly Mussel and the Bald Eagle. You recommend that a biological assessment be prepared to determine if the discharge will impact endangered species. You also recommend that the NPDES permit require Quantum Chemical Corporation to monitor sediments within five hundred feet of the outfall on a yearly basis.

Your staff raised these same concerns and objections five (5) years ago when the permit was last reissued. The issue of contaminated sediments was investigated and addressed by EPA Region VII at that time. Neither we nor EPA consider this to be a concern that can be addressed under the authority of the Clean Water Act (see attached memorandum) and we do not propose to make any changes to the permit as a result of your comments. We recommend you contact Nancy Johnson with EPA's Waste Management Division if you wish to continue to pursue your concerns about sediment contamination.

Sincerely,

Darrell McAllister, Chief
Surface & Groundwater Protection Bureau

cc: EPA Region VII, Water Compliance Branch
EPA Region VII, Superfund Branch

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⑤ Quantum Chemical Co. ²⁸

D. Sefton SNW
W. Page



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

MEMORANDUM

SUBJECT: Quantum/USI Site

FROM: Paul M. Walker, Director
Water Management Division *Paul M. Walker*

TO: David A. Wagoner, Director
Waste Management Division

As you know, there have been discussions among our staffs as to whether contaminated sediments in the Mississippi River, immediately downstream of the outfall from the subject facility, could be addressed under the authority of the Clean Water Act. We had speculated that, under the authority of Section 304(1) of the Clean Water Act, this facility could be listed as a point source causing water quality standards for certain toxics to be violated in the Mississippi River. Specifically, we were relying on the narrative standard adopted by Iowa prohibiting "harmful deposits". Under the 304(1) procedure, the State or EPA would then be required to develop an individual control strategy (ICS) for the point source, that would result in compliance with the water quality standards. In this case, we presumed the ICS could be a requirement that the sediments be removed or otherwise isolated.

In June, 1989, EPA promulgated regulations implementing Section 304(1) of the Clean Water Act. The regulations adopted appear to preclude us from requiring removal of the sediments under 304(1). Specifically, the preamble to these regulations contains the following discussion:

"Several commenters said that an NPDES permit could not require dredging of sediments, and that EPA should not attempt to write ICSs for these sources based on contamination of sediments. Today's regulations do not require this. Rather, EPA is requiring ICSs to contain the necessary effluent limits to prevent further contamination of the sediment and water column. It is EPA's goal that the ICSs for these active point sources achieve applicable water quality standards within the time frames of section 304(1). However, because controls for in-place sediments raise unique problems for the NPDES program, an ICS for such a point source should, at a minimum, prevent additional accumulation or contamination of the sediments that are the source of the toxic pollutant."

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In view of the above discussion, it is our opinion that we would not be successful in getting the contaminated sediments cleaned up under the authority of the Clean Water Act. The current levels of pollutants in the discharge, as limited by the NPDES permit, are not considered to be contributing to any further contamination of the sediments.

If you have any questions do not hesitate to contact me. The member of my staff most familiar with this subject, Don Toensing, can be reached at extension 446.

Nov 2 11 33 AM '89
DEPT. OF
NATURAL RESOURCES